

CLAIMS:

Sub A1
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A 1. A late transition metal catalyst system comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand structure immobilized on a solid support where the catalyst loading is less than 100 micromoles transition metal compound per gram of solid support.

10 2. The catalyst system of claim 1 wherein said *solid* particle support comprises silica.

Sub A2
3. The catalyst system of claim 1 wherein the supported catalyst is a homogeneous supported catalyst.

15 4. The catalyst system of claim 1 wherein the metal complex is a first row metal complex.

20 *Sub A3*
5. The catalyst system of claim 1 comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand structure having conjugated groups on a bridging element in said ligand.

6. A late transition metal catalyst system comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand structure, an organoaluminum compound, and a solid support.

25 7. The catalyst system of claim 6 wherein the organoaluminum compound is an alumoxane.

A 8. The catalyst of claim 7 wherein the metal complex to alumoxane molar ratio is from about 1:500 to 10:1.

30 9. The catalyst system of claim 6 wherein the Group 9, 10 or 11 metal complex is represented by the formula:

LMX_r

35 wherein L is a bidentate ligand that stabilizes a square planar geometry and charge balances the oxidation state of MX_r; X is independently selected from the group consisting of a halogen, alkoxide, aryloxide, amide, phosphide or other univalent anionic ligand, or two such X are joined to form an anionic chelating ligand;

~~and r is 0, 1, 2 or 3.~~

- A 10. The catalyst system of claim 6 wherein said ~~particle~~ support comprises silica.

~~solid~~

- Sub A4 11. The catalyst system of claim 6 wherein the supported catalyst is a homogeneous supported catalyst.

- 10 12. The catalyst system of claim 6 wherein the metal complex is a first row metal complex.

- Sub A5 13. A late transition metal catalyst system essentially without residual solvent comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand structure immobilized on a solid support.

~~Solid~~

- 15 14. The catalyst system of claim 13 wherein said ~~particle~~ support comprises silica.

- Sub A6 15. The catalyst system of claim 13 wherein the supported catalyst is a homogeneous supported catalyst.

- 20 16. The catalyst system of claim 13 wherein the metal complex is a first row metal complex.

17. The catalyst system of claim 13 wherein said complex is an ionic catalyst comprising a metal cation and a noncoordinating anion.

- 25 18. The catalyst system of claim 17 wherein the noncoordinating anion is ~~tetrakis(perfluorophenyl)borate~~ ~~tetrakis(perfluorophenyl)boron~~.

- A 30 ~~19.~~ The catalyst system of claim 17 wherein the ionic catalyst is prepared using an anion ionizing precursor that is a halide salt of Group 13-16 metals or metalloids.

- Sub A7 20. The catalyst of claim 17 wherein the metal complex to ionizing anion precursor molar ratio is from about 10:1 to 1:10.

- 35 21. The catalyst system of claim 1 wherein said complex is an ionic catalyst comprising a metal cation and a noncoordinating anion.

22. The polymerization process for polymerizing olefinically unsaturated monomers comprising contacting one or more of ethylene, C₃-C₂₀ olefin, C₄-C₂₀ cyclic olefin, C₄-C₂₀ non-conjugated diolefin, C₈-C₂₀ aromatic substituted olefin, C₄-C₂₀ gem-substituted olefins, or C₂₀-C₁₀₀₀ olefin macromer with the catalyst system of claim 1.
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23. The polymerization process of claim 22 comprising conducting said contacting under gas phase polymerization conditions.
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24. The polymerization process of claim 23 wherein the reactor temperature is from -100 °C to 150 °C and at a pressure up to 7000 kPa.
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25. The polymerization process of claim 24 additionally comprising a scavenging compound.
26. The polymerization process of claim 22 comprising conducting said contacting under slurry polymerization conditions.
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27. The polymerization process of claim 26 wherein the reactor temperature is from 0 °C to 150 °C and at a pressure from 0.76 MPa to 4.8 Mpa
28. The polymerization process for polymerizing olefinically unsaturated monomers comprising contacting one or more of ethylene, C₃-C₂₀ olefin, C₄-C₂₀ cyclic olefin, C₄-C₂₀ non-conjugated diolefin, C₈-C₂₀ aromatic substituted olefin, C₄-C₂₀ gem-substituted olefins, or C₂₀-C₁₀₀₀ olefin macromer with the catalyst system of claim 6.
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29. The polymerization process for polymerizing olefinically unsaturated monomers comprising contacting one or more of ethylene, C₃-C₂₀ olefin, C₄-C₂₀ cyclic olefin, C₄-C₂₀ non-conjugated diolefin, C₈-C₂₀ aromatic substituted olefin, C₄-C₂₀ gem-substituted olefins, or C₂₀-C₁₀₀₀ olefin macromer with the catalyst system of claim 13.
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